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| EXAMINER | |
|---|---|
| AMIN, JWALANT B | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2628 | |

DATE MAILED: 07/27/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/691,396 | HIGGINS, MICHAEL .FRANCIS | |
| | Examiner | Art Unit | |
| | Jwalant Amin | 2628 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *21 October 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-29* is/are pending in the application.

4a) Of the above claim(s) *22-29* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *21 October 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

## DETAILED ACTION

### *Election/Restrictions*

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:

   I. Claims 1-21, drawn to a method and system for converting a source color space of N primary color points to a target color space of N+1 or more color points, dividing the target color space into a set of regions, classified in class 345, subclass 591.

   II. Claims 22-29, drawn to a method and system for calculating multiprimary conversion matrices by compressing these matrices into smaller dimensioned matrices, performing matrix multiplies with these smaller matrices, and multiplexing the results to create multiprimary values, classified in class 345, subclass 644.

2. The inventions are distinct, each from the other because of the following reasons:

Inventions I and II are related as combination and subcombination. Inventions in this relationship are distinct if it can be shown that (1) the combination as claimed does not require the particulars of the subcombination as claimed for patentability, and (2) that the subcombination has utility by itself or in other combinations (MPEP § 806.05(c)). In the instant case, the combination as claimed does not require the particulars of the subcombination as claimed because group I is a method and system for converting a source color space of N primary color points into a target color space of

N+1 or more primary color points. Group II is a method and system for calculating multiprimary conversion matrices.

3. Because these inventions are independent or distinct for the reasons given above and have acquired a separate status in the art in view of their different classification, restriction for examination purposes as indicated is proper.

4. During a telephone conversation with Stuart Kaler on 6/29/2006 a provisional election was made without traverse to prosecute the invention of Group I, claims 1-21. Affirmation of this election must be made by applicant in replying to this Office action. Claims 22-29 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

***Claim Rejections - 35 USC § 102***

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1-9 and 11-19 are rejected under 35 U.S.C. 102(b) as being anticipated by Childs et al. (GB 2,282,929; hereinafter referred to as Childs).

7. Regarding claims 1, Childs teaches a method for converting from a source color space to a target color space, said source color space resulting from a combination of N primary color points and said target color space resulting from combination of N+1 or more primary color points in said target color space, wherein N is an integer (Fig. 4, pg.

12 paragraph 3; four display drive signals correspond to target color space where four corresponds to N+1; three primary transmission system corresponds to source color space where three corresponds to N; Rs, Gs and Bs corresponds to three primary color points of source color space), the method comprising for the target color space, defining a set of at least N+1 primaries in which color points will be rendered as a combination of said primaries (Fig. 5, pg. 17 last paragraph; four display colour primaries $R_d$, $G_{1d}$, $G_{2d}$, $B_d$ corresponds to defining a set of N+1 primaries; point D65/colours inside the triangles corresponds to color point rendered as a combination of said primaries); defining a color point in the interior of said target color space (Fig. 5; $R_d$, $G_{1d}$, $G_{2d}$, $B_d$, D65 corresponds to color point defined in the interior of said target color space); dividing said target color space into a set of regions that are bounded by at least three primaries, said one of at least three primaries comprising said interior color point (Fig. 5, pg. 8 paragraph 4; dissecting the colour gamut of display corresponds to dividing said target color space; triangles corresponds to regions; formed by sets of three of the display primaries corresponds bounded by at least three primaries; Fig. 5 shows that the triangles formed includes the interior color points $R_d$, $G_{1d}$, $G_{2d}$, $B_d$); calculating solution matrices for each said region (pg. 9 last paragraph, pg. 10 3$^{rd}$ paragraph; take sets of three of the display primaries and form a 3 by 3 display matrix corresponds to forming solution matrices for each said region; the separate solutions ... each solution produces drive signals corresponds to calculating solution matrices); for any given color point in said source color space, calculating which said region the color point lies in and using the calculated region to select one of said solution matrices for rendering said source color point with

said target primaries (Fig. 3, Fig. 5, pg. 10 1st paragraph, pg. 12 4th paragraph; D65/white point corresponds to any given color point; Rs, Gs and Bs system primary signals correspond to source color space; a logic unit ... selects a set for which each pixel has only positive output signals correspond to calculating which said region the color point lies in; respective matrix outputs are input to switches controlled by input unit corresponds to using the calculated region to select one of the solution matrices for rendering said source color point with said target primaries; if the triad of primaries ... display matrix is negative corresponds to point does not lie in that region).

8. Regarding claim 2, Childs teaches N is 3 (pg. 12 paragraph 4; Rs, Gs and Bs corresponds to three primary color points of source color space where N is 3).

9. Regarding claim 3, Childs teaches interior color point is the white point of the target color space (Fig. 5, pg. 7 lines 1-2; Fig. 5 shows that D65 is the interior point of the target color space; balance point or white point is same as illuminant D65 point).

10. Regarding claim 4, Childs teaches interior color point is an off-white color point of the target color space (Fig. 5 shows point $G_{3d}$ which in an interior point of the target color space, and it is an off-white color point).

11. Regarding claim 5, Childs teaches regions are substantially triangles (Fig. 5, pg. 8 paragraph 4; triangles formed by sets of three of the display primaries corresponds to regions are substantially triangles).

12. Regarding claim 6, Childs teaches calculating a matrix that converts between an intermediate color space and the destination color space for each said region bounded by at least three primaries (pg. 9, pg. 10 1st paragraph; XYZ corresponds to

intermediate color space; real display primaries/display primaries/P1P2P3 corresponds to destination color space with at least three primaries; take sets of three display primaries corresponds to each region bounded by at least three primaries; equations 3e and 3f shows to calculate a matrix that converts between an intermediate color space XYZ and the destination color space P1P2P3).

13. Regarding claim 7, Childs teaches the intermediate color space is CIE XYZ space (pg. 4 equation 1a, paragraph 2nd from last; X Y and Z are tristimulus values ... CIE 1931 colour space corresponds to intermediate color space is CIE XYZ space).

14. Regarding claim 8, Childs teaches the intermediate color space is the source color space (pg. 10 equation 3g, paragraph 2; tristimulus values of Rs Gs and Bs corresponds to intermediate color space; Rs Gs and Bs corresponds to source color space).

15. Regarding claim 9, Childs teaches determining which region said color point resides (Fig. 3, Fig. 5, pg. 10 1st paragraph, pg. 12 4th paragraph; D65/white point corresponds to color point; a logic unit ... selects a set for which each pixel has only positive output signals correspond to determining which said region the color point lies in; if the triad of primaries ... display matrix is negative corresponds to point does not lie in that region).

16. Regarding claim 11, Childs teaches a display for displaying image data in at least one of the source color space and target color space and processing circuitry to define a set of N+1 primaries for the target color space (Fig. 4, pg. 12 4th paragraph; Fig. 4 shows the display device displaying image in target color space of four primaries;

decoding circuit corresponds to processing circuitry). Please refer to the statements presented for the rejection of claim 1 for further arguments.

17. Regarding claim 12, the statements presented above, with respect to claims 2 and 11 are incorporated herein.

18. Regarding claim 13, the statements presented above, with respect to claims 3 and 11 are incorporated herein.

19. Regarding claim 14, the statements presented above, with respect to claims 4 and 11 are incorporated herein.

20. Regarding claim 15, the statements presented above, with respect to claims 5 and 11 are incorporated herein.

21. Regarding claim 16, the statements presented above, with respect to claims 6 and 11 are incorporated herein.

22. Regarding claim 17, the statements presented above, with respect to claims 7 and 11 are incorporated herein.

23. Regarding claim 18, the statements presented above, with respect to claims 8 and 11 are incorporated herein.

24. Regarding claim 19, the statements presented above, with respect to claims 9 and 11 are incorporated herein.

### *Claim Rejections - 35 USC § 103*

25. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

26. Claims 10 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Childs, and further in view of Ito (US 4,989,079).

27. Regarding claim 10, Childs teaches all of the claimed limitations as stated above, except he does not explicitly teach to determine the hue angle of said color point and determining from said hue angle which region said color point resides. However, Ito teaches to calculate the hue (hue angle) of a signal (color point) on the basis of the density of ratio of three primaries, and based on the hue of the input signal (color point) it is determined which of the six hue areas (regions) it belongs to (fig. 12, col. 16 lines 35-67, col. 17 lines 1-42). Therefore, it would have been obvious to one of ordinary skill in the art at the time of present invention to calculate hue of a color point to determine it's region of location as taught by Ito and apply it into the method of Childs because calculating the hue on the basis of ratio of spectral densities improves color harmony at the boundary between hue areas (col. 16 lines 38-41).

28. Regarding claim 20, the statements presented above, with respect to claims 10 and 11 are incorporated herein.

29. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Childs, and further in view of Kasson (US 5,450,216).

30. Regarding claim 21, Childs teaches a system for converting from a source color space to a target color space, wherein said source color space comprises N primary color points and said target color space comprises at least N+1 primary color points (pg.

12 4th paragraph), said system comprising input means for accepting source image data color points (pg. 12 4th paragraph; transmission system corresponds to input means); a multi-primary converter for image data values from N-primary source color space into image data values for at least N+1 primary color space (Fig. 4, pg. 12 4th paragraph; decoding circuit corresponds to multi-primary converter)

Although Childs discloses all of the claimed limitations as stated above, he does not explicitly teach a hue calculator to calculate hue angles for the source image data color points, and a gamut converter for optionally fitting the gamut of the source color space to said target color space using the calculated hue angles. However, Kasson teaches to compute the hue angle as the arctangent of the ratio of the two chrominance components (Fig. 5, col. 8 lines 58-68), and a gamut converter for optionally fitting (mapping) the gamut of the source color space (out-gamut points) to said target color space (device-dependent gamut) using the calculated hue angles (Fig. 5, col. 8 lines 32-37 and lines 58-68, col. 9 lines 48-65; Fig. 5 shows that the computed hue angles are used to while mapping from out-gamut points to the device-dependent gamut; Kasson teaches to use the hue angles for fitting the gamut of source color space to the target color space, although he does not teach to use the hue angles optionally, but if the hue angles were used optionally then the gamut converter would be fitting the source color space to the target color space with no difference between them, and there would have been no point of converter the source color space into a target color space if it were to remain the same. It would have been obvious to one of ordinary skill in the art at the time of present invention to use hue angles if they intended to change the

source space to a target color space, different than the source color space). Therefore, it would have been obvious to one of ordinary skill in the art at the time of present invention to calculate and use hue angles for gamut mapping as taught by Kasson and apply it into the method of Childs because using hue angles helps luminance variations at low spatial frequencies to which humans are relatively insensitive (col. 8 lines 52-56).

31. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jwalant Amin whose telephone number is 571-272-2455. The examiner can normally be reached on 9:30 a.m. - 6:00 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Zimmerman can be reached on 571-272-7653. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

*** J.A. 7/20/06

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